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A SMALL THEATER

BY

FERMOR SPENCER CANNON

THESIS

FOR

DEGREE OF BACHELOR OF SCIENCE

IN

ARCHITECTURE

COLLEGE OF ENGINEERING
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THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

FERMOR SPENCER CANNON

ENTITLED A SMALL THEATER

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF BACHELOR OF SCIENCE IN ARCHITECTURE

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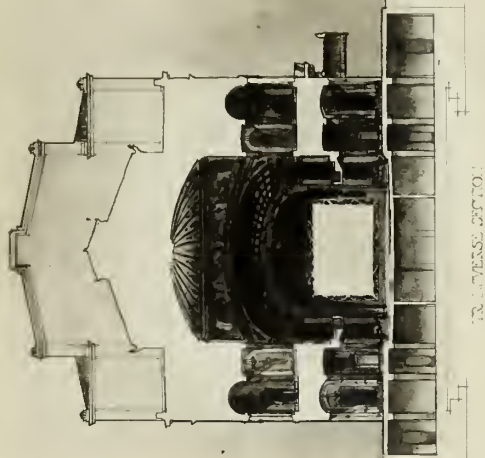
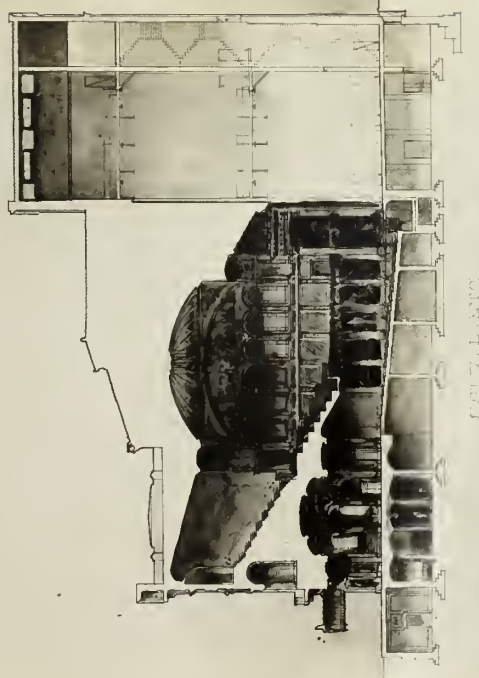
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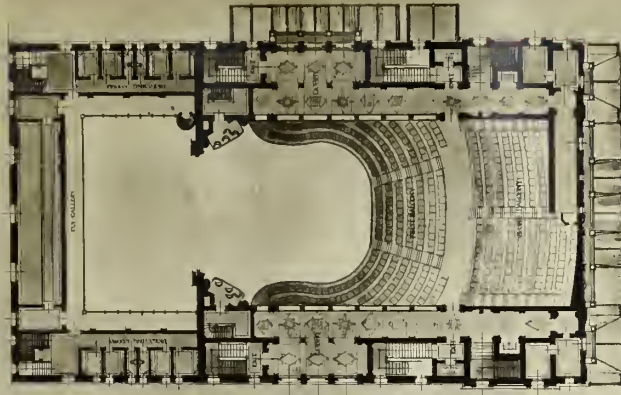
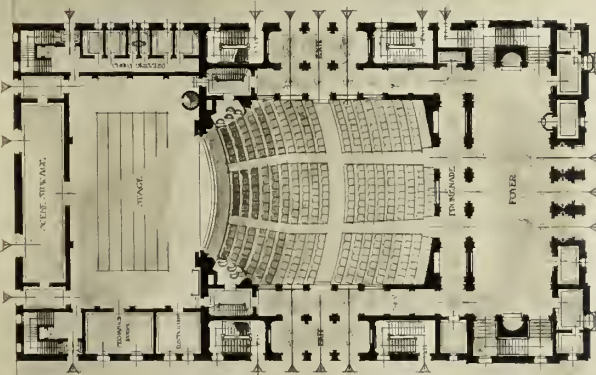
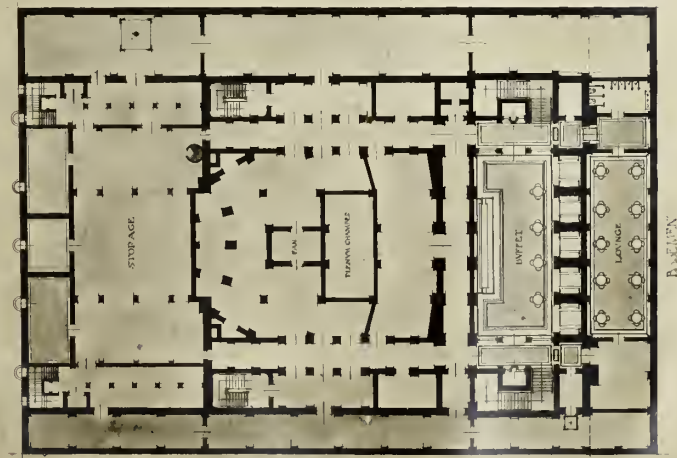
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THEATRE DESIGN



THESES DESIGN



A SMALL THEATER

(For continuous vaudeville and moving picture performances)

To aid in the solution of this problem, the following program was constructed. It is based on the general principles thought to exist most clearly in this thesis.

PROGRAM FOR A SMALL THEATER

It is supposed that a small vaudeville theater is to be built for a syndicate which controls many small theaters in a large city.

Location. One of the conditions of the lease on the building site (a corner lot fronting on an avenue which intersects at right angles another avenue bounding a civic park) is that the theater shall be a civic feature. The lot is 110 feet by 100 feet.

Protection. Proper courts and fire walls shall be provided on the side abutting the next building. Also a sufficient number of fire stairs, exits, etc. to both side, front, and alley.

Accessories. In the plan shall be included 2 lobbies (one on the avenue side, the other on the park side); ticket office; men's toilets and smoking room (may be located in the basement); ladies' retiring room and toilet; refreshment shop located in the basement; manager's office; coat room for employees; and separate stairs from balcony.

Auditorium. To seat at least 500 people. Lighting to be easy, and special stress laid to general lighting, heating, and ventilating. Balcony may be of horse-shoe type, and shall contain the proper

proportion of seats. Provide for entrance stairs, and exit stairs leading to park side of theater from avenue lobby, and foyer on first floor, exits to park side. This allows for a quick change of audience. Provide 4 boxes. Also orchestra pit. Provide that fire walls be built around the auditorium.

Stage. Its area should be almost as great as that given to the auditorium. Provide fire walls between auditorium and stage. Stage loft will be about 120 feet high. First gallery about 50 feet, second at 75, and gridiron at 100 feet. Ventilate freely through the roof. Provide 4 star dressing rooms (toilets); 6 dressing rooms (lavatories); men's toilet; women's toilet; wardrobe room; painters' gallery; carpenters' room; mechanics' and electricians' room; and lounge. Also all proper exists and entrance for the stage accommodation. A storage loft may be planned in connection with the painters' gallery. Provide all necessary apparatus for moving baggage and scenery.

INFLUENCES GOVERNING THEATER DESIGN.

This subject has been treated many times by very noted architects and it would be great arrogance to attempt to cover the same field. But as an aid in the study of the work in hand, it was found very useful to review the economic and historical details dealing with the evolution of theater design, in order that the spirit of such a building might be more fully realized.

History of the theater.

It can probably be stated, without undue assumption, that the theater has existed in same form from the beginning of history. Through the ages the theater has been made possible because of many motives, among which may be stated religious worship and entertainment and instruction.

In Egypt the priests organized and monopolized religious pageants and dances. As rhythm and color were first recognized as a primitive means of satisfaction of the human mind, we find these early dances based on these principles. They seemed to arouse a more sensual interest in the religion. People enjoyed these dances so much that soon the priesthood lost control, except for temple worship. The dances peculiar to that region including Egypt were eventually performed in public squares and under private management.

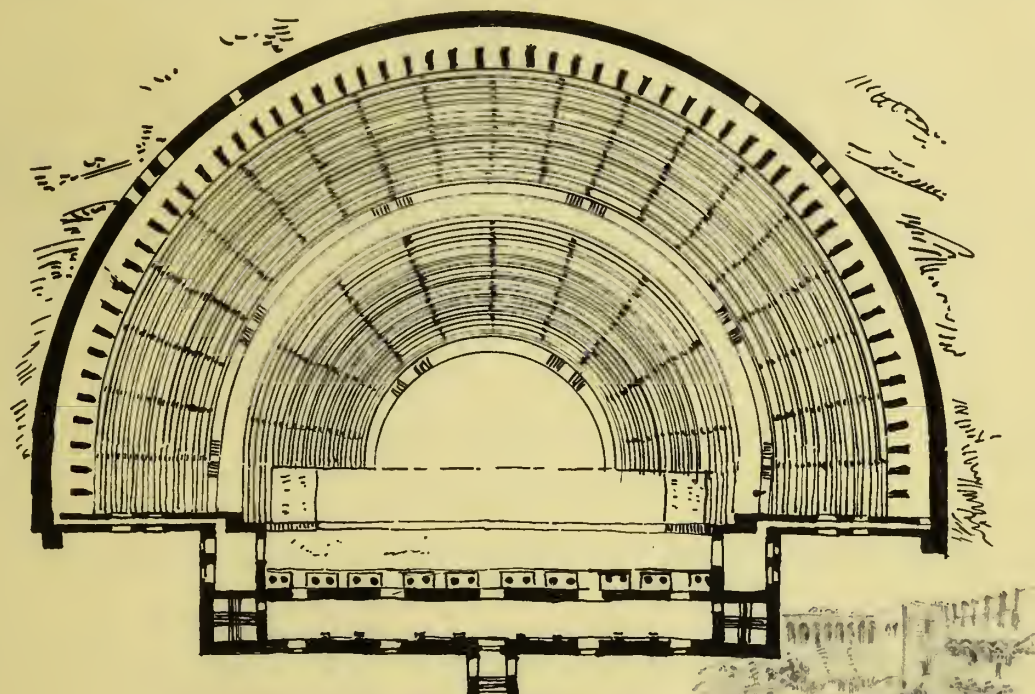
Along with the dancing, the folk-lore legends recounted by word of mouth by story-tellers had also become a much loved custom. Many choice bits of literature illustrating the usual type of these stories have been found.

Still later, in Greece, we find a new civilization which easily combined all the features of this older people. Due to the fact that two classes existed, the citizens alone controlled the growth of this civilization-the slaves having nothing to do with the government. Intellectual ideals were raised to a very high point for that period. The arts of the author has taken a higher

place than that of the story-teller and dancer but had not entirely blotted them out. The story itself was told in a rhymed meter, which represented to the ear, what the dancer has been to the eye-man has grown intellectually. In the case of the theater in Greece, we again find it to be a religious motive.

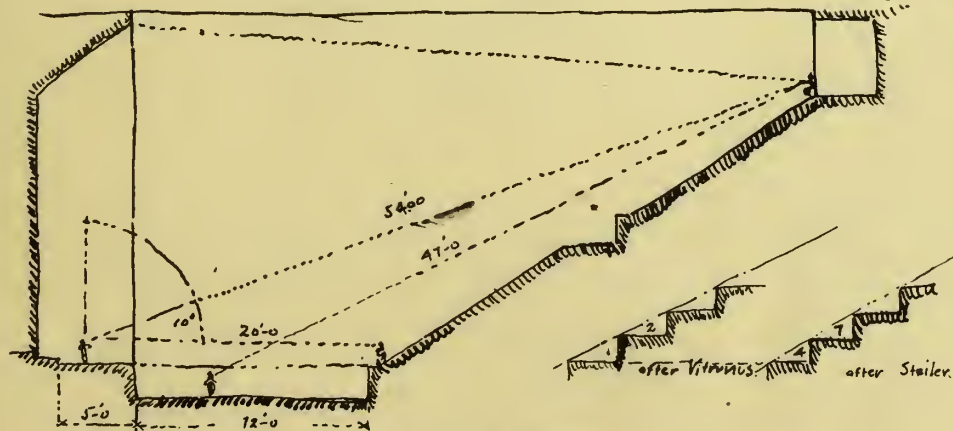
The main features of the Greek drama as first presented, were the chorus and dialogue. From this simple form, the drama changed rapidly. First it was played in the hollow of any convenient hill, but later, as it became more dignified and defined, it called for effects and a proper location. Instead of a chorus and actors grouped about an altar, there was in addition a semi-circular arrangement of tiers of seats; a raised stage whose front edge formed the straight side of the half circle, and built up scenery at the rear.

The Greek theater consisted of a theatrum, or spectators seats, in the form of a semi-circle, separated into two parts by a lobby. The citizens sat down in front, and the slaves at the rear. At the back and top was placed a colonnade, or general circulation. The lower part was reached by passing through the open space around the altar while the upper part was reached by stairs at either end next the stage and from various points of the lobby. The front line of the stage was placed quite a distance back of the center, and was raised the height of a mans' head above the sand-covered, orchestra in front. Backing the stage, was the usual scenery. It had three main entrances, and usually extended



Theater in Aspendos.

GREEK THEATER.

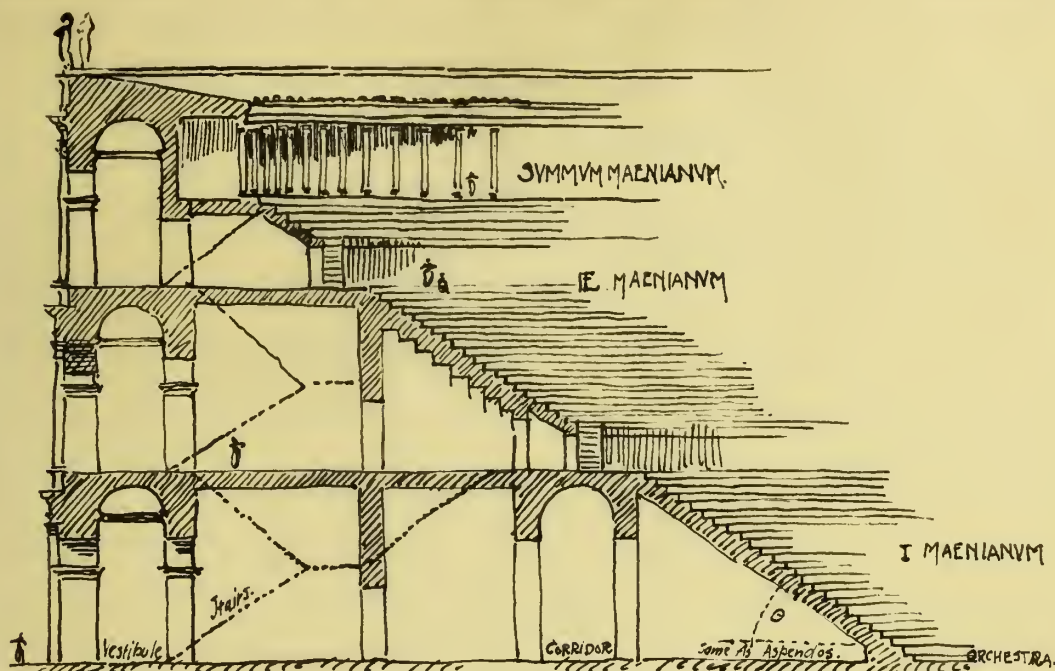


Longitudinal Section
Through Aspendos.

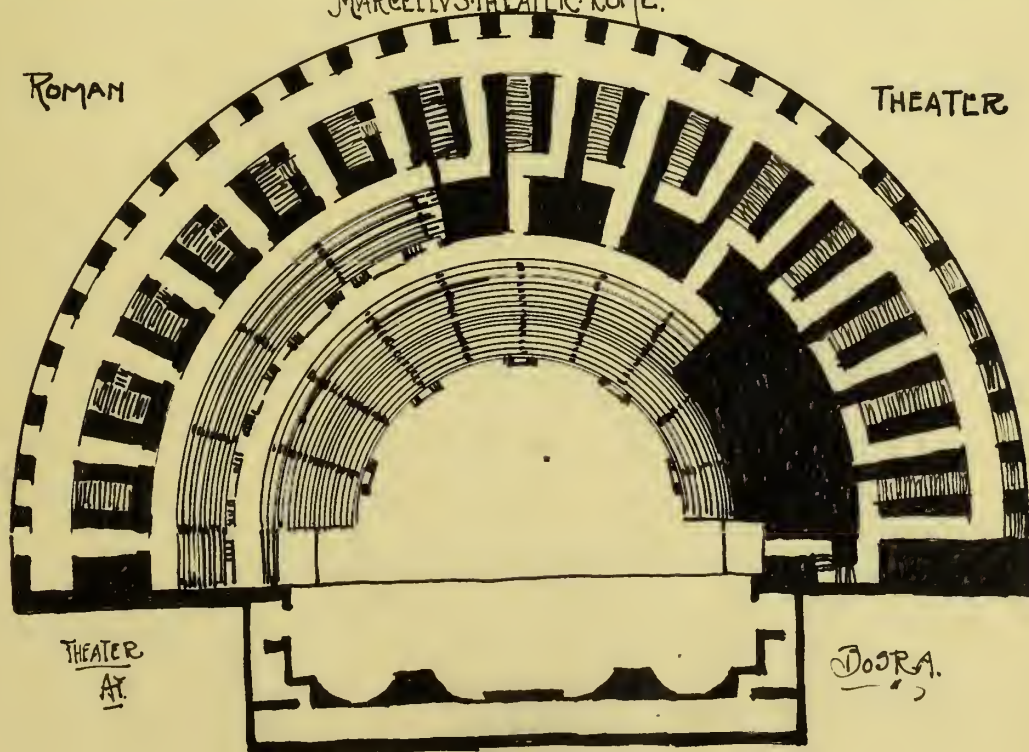
to the height of three stories, with various windows and niches in the wall. The whole theater was open to the air, except a proscenium arch over the actors and for a possible awning over the audience.

The Greeks planned their theaters to seat as many as possible, and hence perfected the sight lines used in accommodating the spectators. They used every available hill-side and even carved seats from natural rock. Generally, a sufficient foundation was placed, and the seats were constructed of stone. In proportion, the seats were about like those of our present-day bleacher seats. In Athens we find a theater seating 50,00 people. The spectacle was the main feature to the populace, but in this case the principles of acoustics were used. All around the space used for seats were placed bell shaped vessels of bronze at points of focus of the sound waves. They distributed the sound to all parts of the vast theater.

In the Roman theater are found the same essential parts as in the Greek theater. The main difference lay in the geometrical solution, and in the problem of construction and circulation. The geometry is explained by Vitruvians. The front of the stage passed through the center and the theatrum formed an amphi-theater. The matter of acoustics was also taken into consideration. The outside of the amphi-theater was constructed of a series of superimposed colonnades, connected by cleverly constructed stairways.



MARCELLVS THEATER. ROME.



ROMAN

THEATER

THEATER
AT

DOORA.

By this means of circulation easy access was obtained to all parts of the theater. The exterior was decorated with superimposed orders and arches, of which construction the Circus Maximus is a good example. The plebeians sat upon these bleachers, while the patricians took their places upon the stage.

With the fall of Rome, the old civilization was smothered. Innate mysticism and quaint legends lead the people of northern Europe to develop the masque and mystic play. As before, these plays were originated by the priests and founded mostly on church history, and more intended to cause the people to feel more deeply the power of the church. Very soon other plays were originated, and performed by people outside of the church. With these plays as a basis, the early Elizabethan drama was developed. With this period came the first theater of modern times, the Globe Theater.

This first theater consisted of a rough wooden auditorium, rectangular in shape, with the stage in the center. On it the dandies sat, while the crowd sat on benches or stood up about it to enjoy the performance.

Within a short period of years, a curtain was introduced. Also the proscenium arch which was suggested in the old Roman Theater. Boxes were added, and the orchestra was placed in what was called the pit. The floor was bowed and with a better knowledge of construction, the balcony was added, suggested most likely by the balconies in the courtyards of the London Shakespeare's time.

With the development of ^{the} grand opera, came the desire for more impressive and elegant architecture. Thus we have the magnificent conceptions of the Paris Grand Opera House, with its tiers of boxes and galleries, and wonderful stair way and foyers. The Opera House of Berlin, Vienna, and London, are also examples of this splendid class of theaters.

The drama and musical comedy require less pretentious play houses, hence smaller theaters. The fact that the general public was interested more in this class of plays, changed the design to one which would accommodate more people. Hence, tiers of boxes gave way to balconies. Foyer room was sacrificed to seating space.

With growing democracy in this country and the increased interest of the general public in the theater, a demand was felt for cheaper shows. To meet this demand, shorter plays, which could be ^{given} twice in the evening, were written. Acts of all sorts, from gymnastics to Grand Opera, were put on the same stage together. Even a small house could be made to pay well if two shows were given each evening. Finally, with the rush of the present day, the continuous vaudeville came into vogue. Now the masses of this great Country may have entertainment for very little cost. It is on this class of people that the educational effects of the theater should be brought to bear. It is worth trying to make an appeal to them for better ideas of art and culture. This is our problem.

THE ESSENTIALS OF THIS PROBLEM.

The fundamental essentials for the logical solution of the problem (of a small theater for continuous vaudeville) are as follows:

(1) Ease of circulation. All exits and aisles and promenades must be arranged so that people can pass in or out with the minimum interference.

(2) Sufficient foyer, or lobby room, should be provided so that people shall not have to wait outside until the beginning of the next performance.

(3) All entrances and exits should be so plainly shown in the planning that no person need hesitate as to the way in or out.

(4) One audience shall be removed by the exits, without interfering with the entering audience.

(5) The balcony shall have separate enclosed fire-tower stairs which shall lead directly to the street without a break or interference.

(6) The stage must be made larger, almost the same size as that required by the comedy. This is to facilitate quick moving of scenery.

(7) Dressing rooms should be arranged with outside light and air. It is only fair to improve the quarters of this class of laboring people.

(8) The constant use of the moving picture machine demands, also, that easy and clear sight lines be planned. A special curtain

should be provided for motion pictures.

The ideas which relate closely to the personal well-fare of the audience, should be the basis of planning. Present-day "public opinion" is the greatest factor in ^{the} movement towards the adoption of the best methods of protection to the life and pleasures of the people. Managers are finding that the best policy is to safeguard their patrons.

The primary idea of a theater is to rest, please, and entertain the audience. It is not money lost to be able to impress people even if for only a few minutes, with the beautiful combination of color and form. The aesthetic development of the masses is a function that the theater can easily perform. The ornament should be rather rich and elegant in the foyers and on the proscenium arch. The rest of the auditorium should be more subdued and quiet. Proper balance and proportion are essential features to be remembered in designing. Attractive vistas, pleasing curves in the auditorium, artistic little niches in the foyers and lobbies containing appropriate bits of statuary, and a pleasing evenly-balanced lighting of the interior, all these things are important to obtain the satisfactory solution of this part of the problem.

Personal comfort should also be considered very carefully. Easy and comfortable seats, spaced sufficiently to avoid the unnecessarily close contact of spectators. This feature must be figured very closely as valuable seating space may be wasted. The seating should be balanced so that the aisles may be easily inclined and never broken by steps. All seats in rows, should be placed

securely on a level platform or step. The incline has been found to be trying to the feet. The seats should be slightly staggered. All sight lines should be very carefully adjusted from all parts of the house. Especial care was taken with this feature.

All exits must be clearly shown. An aisle should lead directly to an exit at least not more than half its width off center. First floor exits should lead directly to the nearest street. Exits from the balcony should be by continuous fire-tower-stairs, to the street level. It is better that the stairs should not lead to a common point, as splitting the crowd up into small units averts the fear of panic. No points in passages which would impede the progress of the out-going audience, should be allowed.

Electricity has made many changes in stage apparatus and lighting. It is now possible to obtain any effect.

The stage loft and storage room for scenery should be provided with ample vents.

THE SOLUTION OF DIFFICULT FEATURES OF THEATER DESIGN.

Heating and Ventilating. The air to heat is usually brought in from outside; passed through a plenum chamber by a fan, and delivered to all parts of the house on the first floor by small openings under each seat. This air should be heated very slightly as the heat from the audience is a large factor. The foul air is taken out from the under side of coves and balconies by suction fans. These fans are automatically turned on when the curtain is lowered. This

does away with any direct draft, so dangerous in the event of fire. Foyers and lobbies may be heated directly by radiators.

Lighting. Theater lighting is expensive and difficult, The practice now is to use large units of lights and outline the balconies with carefully shaded light. Direct rays must be avoided as they are very harmful. The proscenium may be lighted by soft glowing spots. Indirect lighting may be used under balconies, and to great advantage in foyers and lobbies. Many pleasing novelties have been used in this form. Gas should supplement the electric at all exits. The lamps should be uniform in color. Light may be arranged so that the architectural features are all properly emphasized.

Safety Devices. Great theater fires, such as that in Vienna at the Ring in 1881, about 1800 lost their lives; at Paris, Opera Comique, about 600; at Exeter in England, about 200; at Conway's in Brooklyn, about 300 killed,- have caused "public opinion" to demand devices to protect those who would seek pleasure. The last disaster of this sort was at Chicago in 1903, at the Iroquois fire when about 580 lost their lives. The largest percent of the dead, were found in the balconies and galleries.

The stage loft is full of highly combustible materials, canvas and ropes, controlled from two bridges and hung from a gridiron. The rapidly burning fire heats the air and causes the gases to be forced out into the balconies and galleries. Suffocation results.

Mr. John R. Freeman, M. E. in his books gives three fundamental safe guards.

(1) The providing of ample, automatic, quick opening smoke vents over the stage loft.

(2) The thorough equipment of the stage with sprinklers, so calculated as to produce a downpour tenfold heavier than a thunderstorm.

(3) The provision of especially ample exits and stair ways from the balcony.

For the first remedy the two best types of smoke vents are suggested, i. e. the monitor type and sliding vent. Both are released automatically by means of fusible links, either one of which when melted releases the counter weight and immediate action takes place. The sides of the monitor are dropped and the sliding vent slides down an incline to clear the opening immediately. These devices are also operated by a cable pull from the prompter's stand or by electric fuses. They may be tested by partly opening for ventilation at each performance. Four vents each of 100 square feet area will be sufficient for the ordinary theater. This changes the stage loft into a veritable chimney.

Automatic sprinklers should be placed in the stage loft so as to drench the scenery below and in any place where materials are likely to lie in piles or stacks. One set should be placed above the other or staggered, and a line may be carried around the fly galleries. Fusible links are used, and arrangements in piping should be such that a test may be made at any time. The heads are usually spaced about 8 or 10 feet apart, and are operated from tanks and direct connection to city pressure.

The curtain should be of metal, securely braced and counter-balanced so as to work easily. The released weight will cause the curtain to fall rapidly. The inner side is lined with wire-woven asbestos fibre with an air space in between. The side next the audience is metal. This curtain is the best to date.

A special drop curtain which has a special mercurized screen for moving pictures is an essential feature.

GENERAL DETAILS OF CONSTRUCTION.

The frame work of this structure should be steel, as concrete construction alone would greatly increase the weight of some portions of the building. The balconies are framed with steel cantilever trusses, and the floors are fire-proofed with reinforced concrete slabs. The verticals members of support are steel columns protected by concrete. All footings are to be figured in reinforced concrete to suit the nature of the soil.

The girders and beams throughout are fully protected by concrete or tile at all points where exposed. The main floor should be entirely composed of steel and concrete construction. The under side of the balcony should be formed with wire lath and supported by steel hangers and covered with cement mortar. The use of wood is to be avoided in constructing all ceilings, and wire lath and plaster used to form all coves, etc. A rather heavy wall of steel-concrete construction or other equally fire resisting and stiff construction will be approved, to separate the auditorium and stage. The stage floor should be supported excepting for the space used for setting scenery it may be of concrete slabs.

That part used for setting up should be of wood to allow of traps and cutting if necessary. The interior walls around the stage should be steel concrete, as well as the fly galleries, and all floors throughout this section of the theater. All framing around domes and the doors should be metal. All wooden trim to be done away with if possible.

The roof on the auditorium and stage loft is to be trussed, and the ceiling of the auditorium hung from metal hangers. The roofs over these portions are steel and tile. The monitor on top of the auditorium is steel framed and the sides are faced with copper. The other portion of the roof are copper or gravel. The exterior walls do not carry much weight, and since the decoration is modeled terra-cotta and light colored bricks; these walls may be steel and brick construction. All such features as balconies, window-casements, surface decorations and cornices are constructed of architectural terra-cotta.

All fire stair-towers should be built with especially heavy walls of steel-concrete. The stairs throughout the building should be reinforced concrete.

The floors of the corridors and foyer may be terrazzo marble or enamel. Flemish tile may be used in the basement in the Buffet and Lounge. All columns and pilasters for decorative purposes are scagliola. All moldings are plaster.

A few miscellaneous features have suggested themselves as part of the complete problem-a Buffet and Gentlemen's Lounge may be located in the basement. A confection stand and cigar or flower stand are also good features. The toilets have been made small because of the short performances and hence, fewer to accommodate.

In this outline of the solution of the various factors of a "Small Theater" (for continuous vaudeville) no definite comparisons have been made, but it can be easily understood that no results of any worth can be obtained without some selection of existing material or practice. It has not been the purpose to create but to modify, with an idea to the aesthetically and mechanically correct solution of the problem in hand.

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